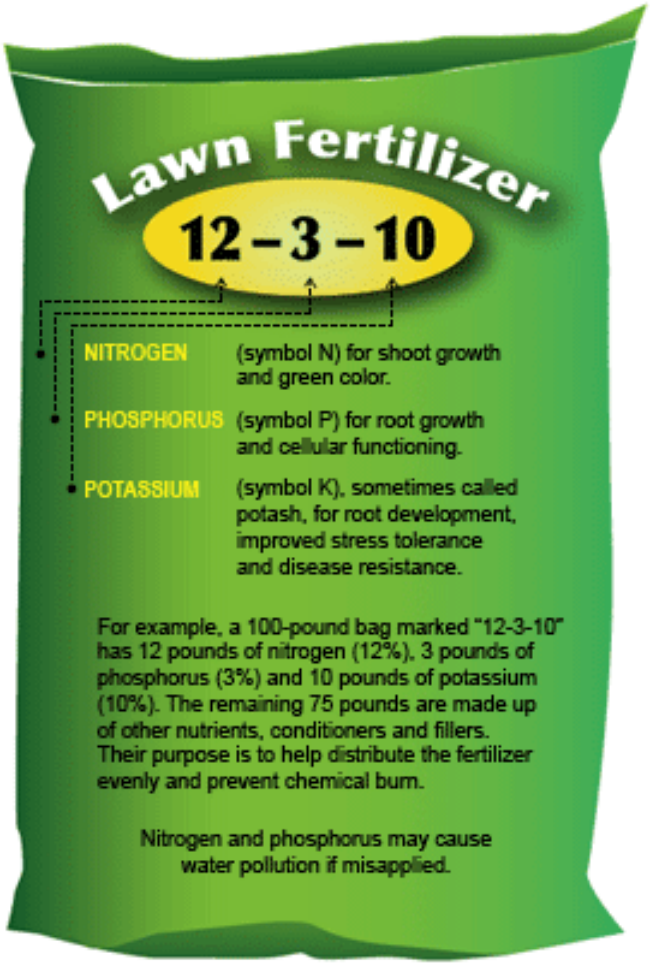
Update on Nutrient Reduction Efforts in Region 8 States

Nutrient Work Group Meeting

May 28, 2015

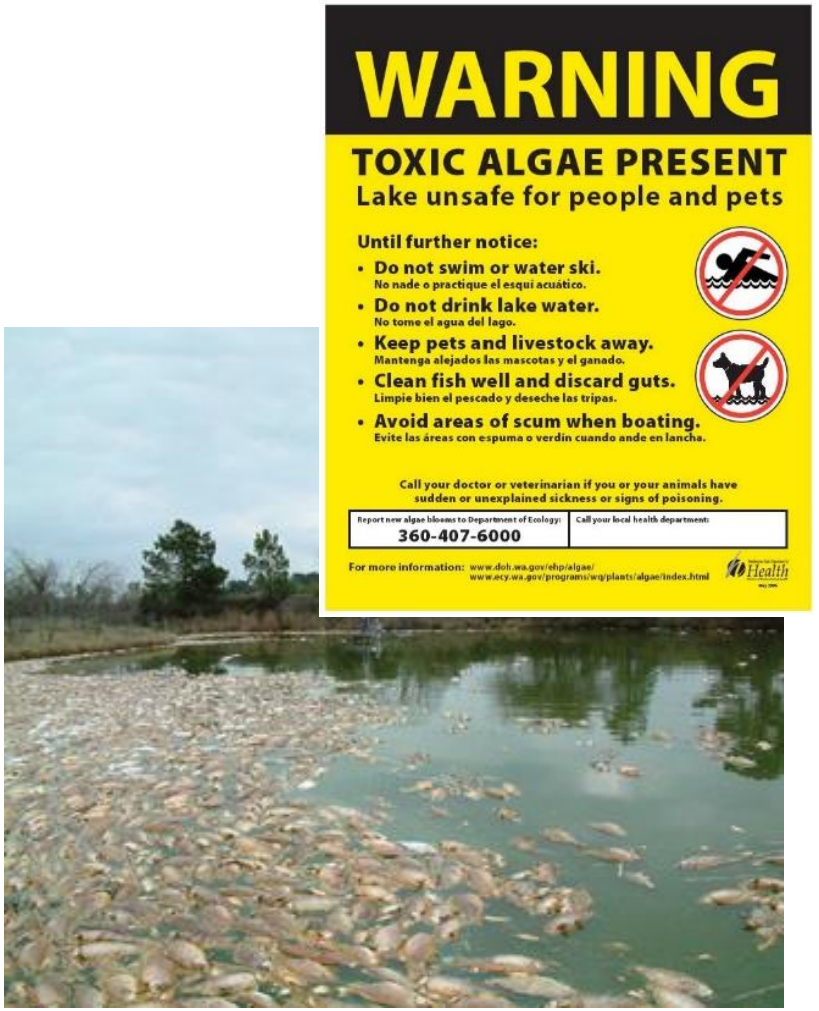
Nutrients

Nutrients = Nitrogen and Phosphorus



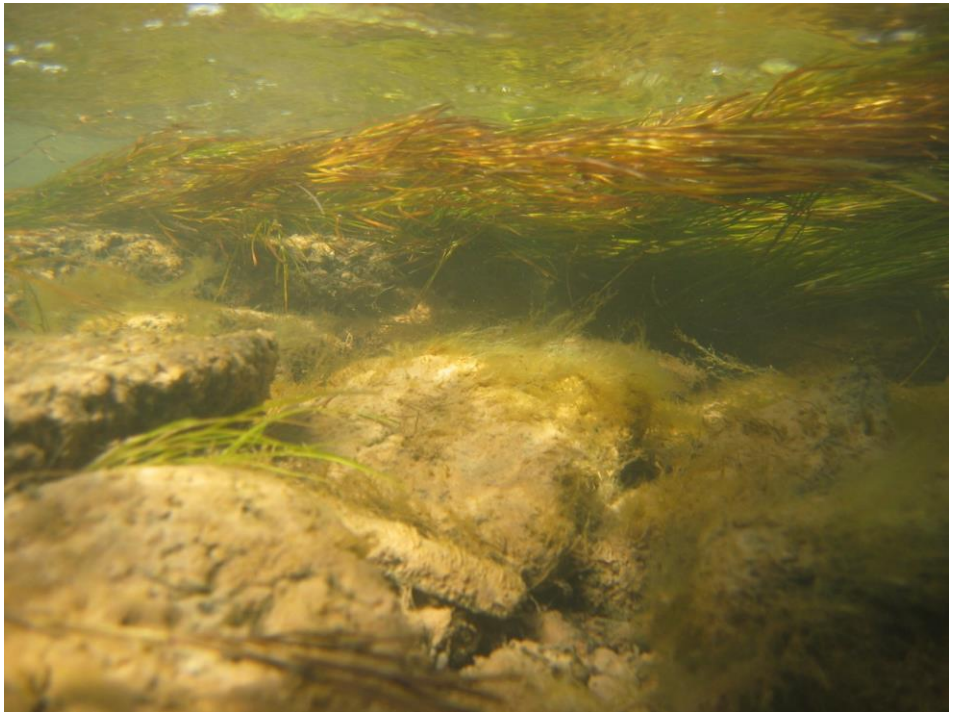
Nutrients and Aquatic Ecosystems

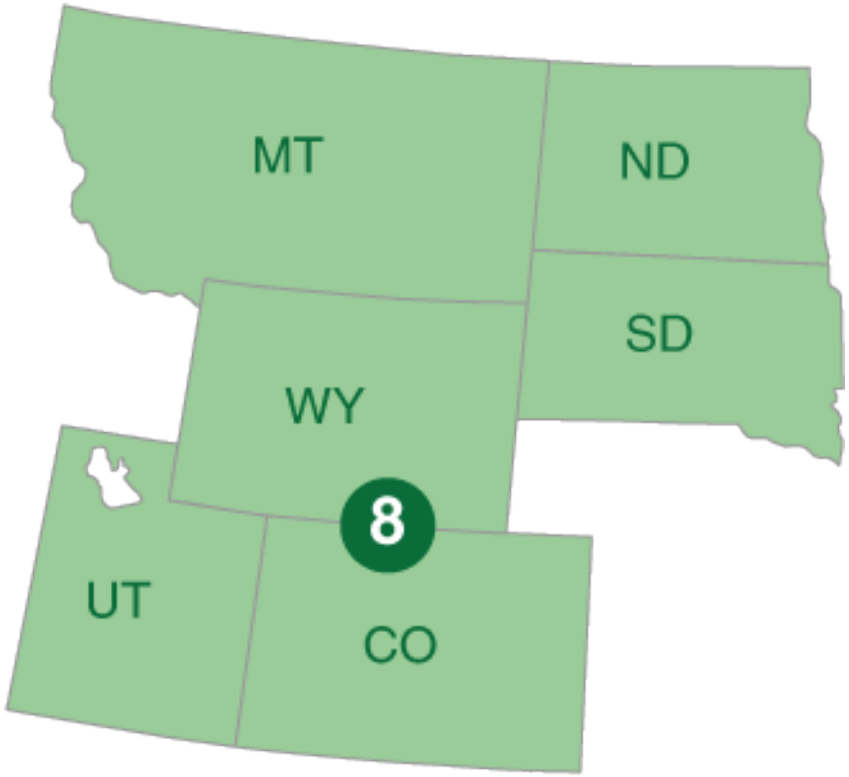
- Excessive nutrients can cause excessive growth of aquatic plants and algae (algal blooms)
  - Decline in aquatic resources, aesthetics
  - Oxygen depletion
  - Elevated pH
  - Fish kills
  - Harmful algal blooms (can produce toxins that impact use of water for drinking, recreation, and livestock)



Outline

- Region 8 States
- Montana
- Utah
- Colorado





Approaches to Nutrient Pollution

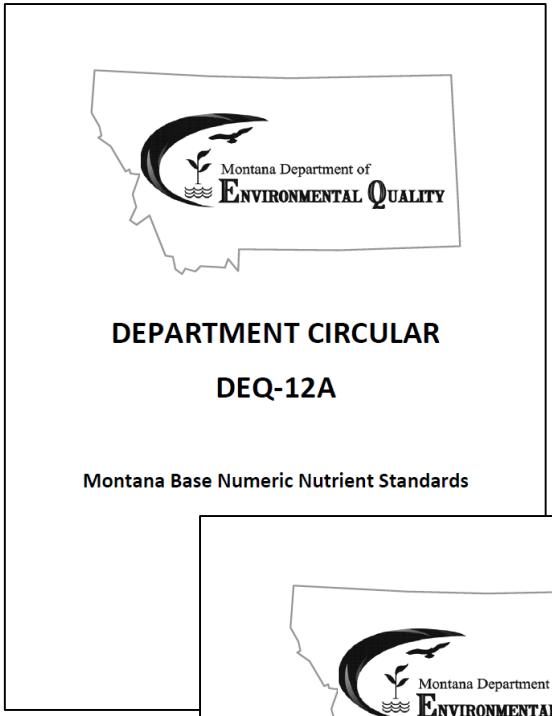
- Region 8 states have approached addressing nutrient pollution very differently

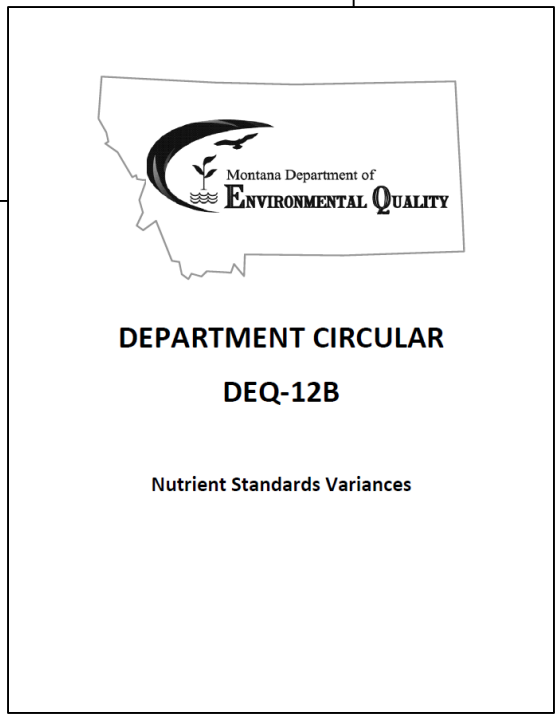
Main approaches:

- Numeric criteria and variances
- Criteria upstream of permitted facilities and effluent limits on dischargers to make near-term progress on nutrient reduction
- Nutrient Reduction Strategy

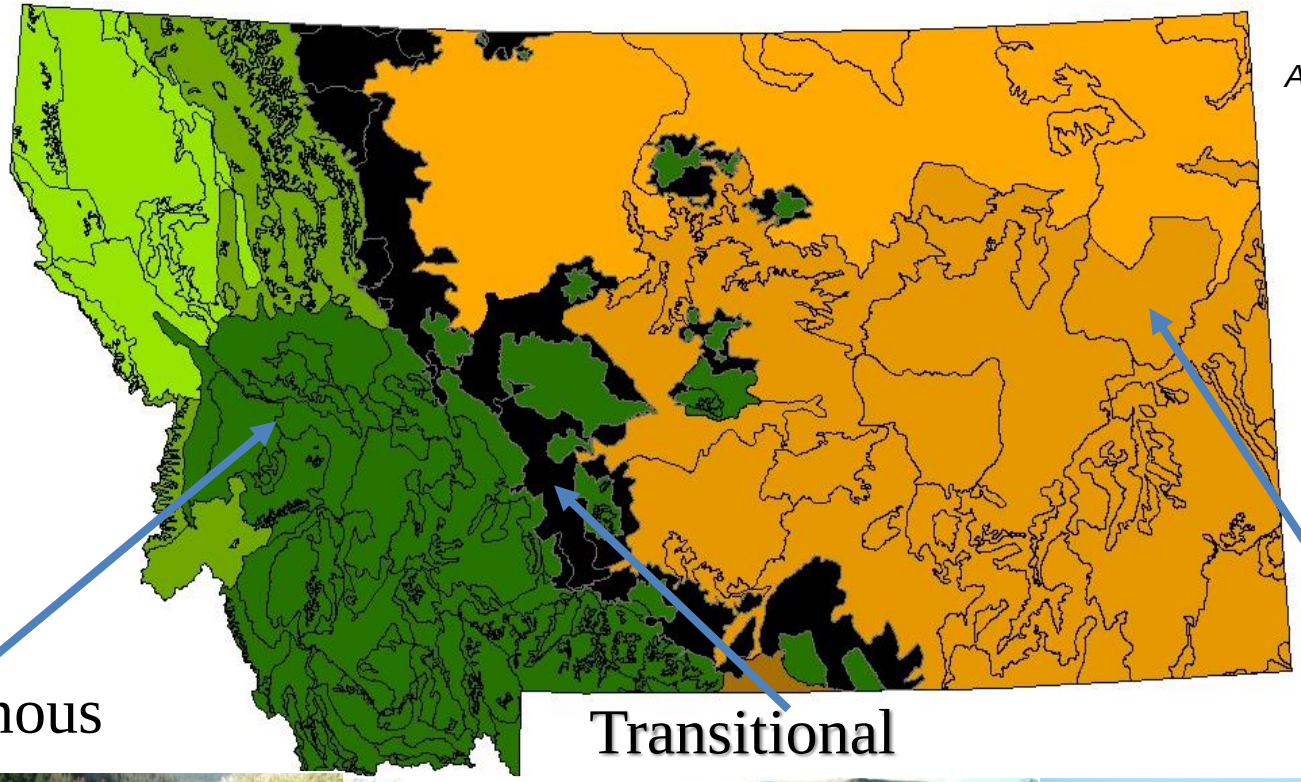
Montana Standards Revisions

- Rulemaking for criteria for wadeable streams and one large river in spring of 2014
- Rulemaking also included variances to nutrient standards for dischargers
- Montana DEQ and Board of Environmental Review adopted revisions on July 25, 2014
- EPA approved on February 26, 2015





Montana Nutrient Criteria



Adapted from M. Suplee

Mountainous

Transitional

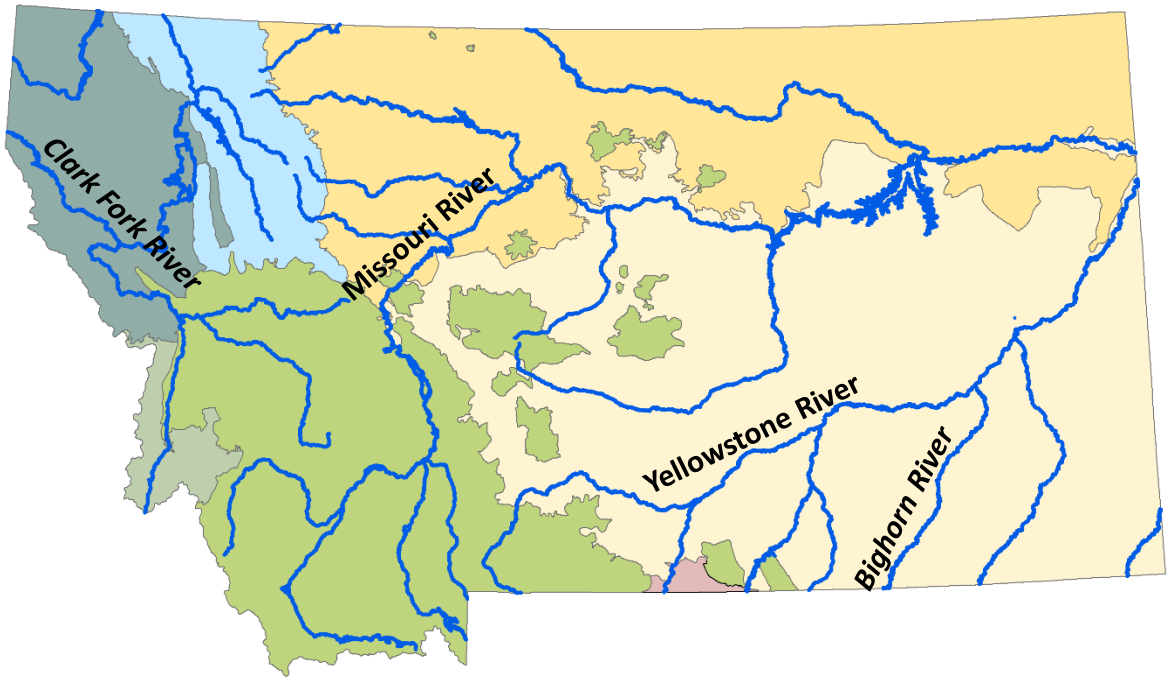
Prairie

Montana Numeric Nutrient Criteria

Ecoregion (level III or IV) and Number	Ecoregion Level	Period When Criteria Apply	Total Phosphorus (µg/L)	Total Nitrogen (µg/L)
Northern Rockies (15)	III	July 1 to September 30	25	275
Canadian Rockies (41)	III	July 1 to September 30	25	325
Idaho Batholith (16)	III	July 1 to September 30	25	275
Middle Rockies (17)	III	July 1 to September 30	30	300
Absaroka-Gallatin Volcanic Mountains (17i)	IV	July 1 to September 30	105	250
Northwestern Glaciated Plains (42)	III	June 16 to September 30	110	1300
Sweetgrass Upland (42l), Milk River Pothole Upland (42n), Rocky Mountain Front Foothill Potholes (42q), and Foothill Grassland (42r)	IV	July 1 to September 30	80	560
Northwestern Great Plains (43) and Wyoming Basin (18)	III	July 1 to September 30	150	1300
River Breaks (43c)	IV	Narrative only	Narrative only	Narrative only
*Non-calcareous Foothill Grassland (43s), Shields-Smith Valleys (43t), Limy Foothill Grassland (43u), Pryor-Bighorn Foothills (43v), and Unglaciated Montana High Plains (43o)**	IV	July 1 to September 30	33	440

Adapted from M. Suplee

Montana Large Rivers

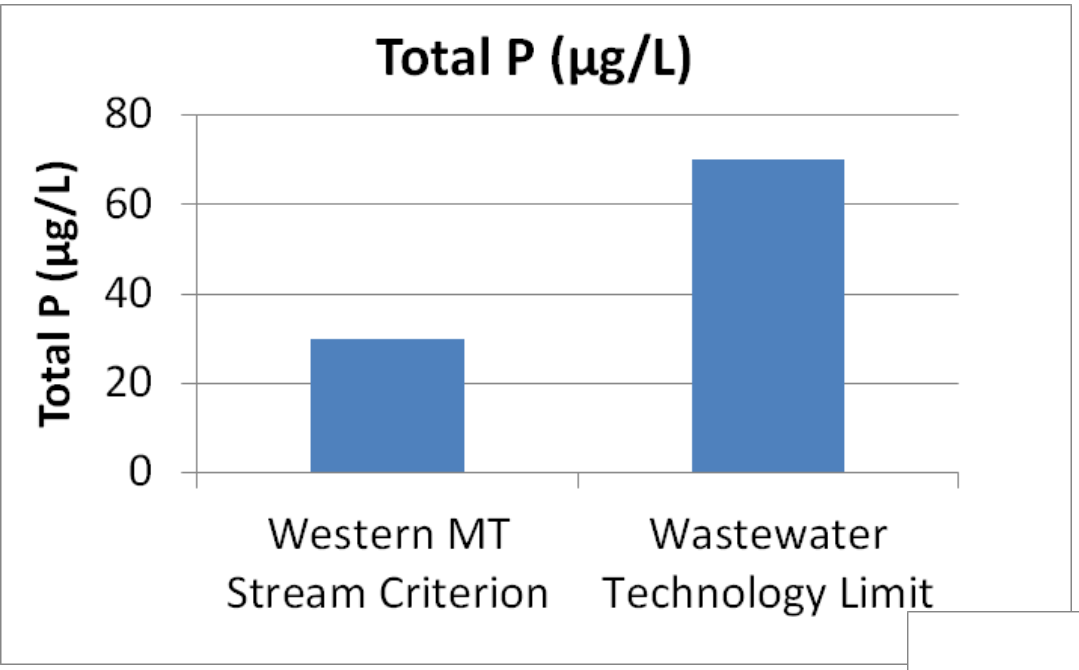


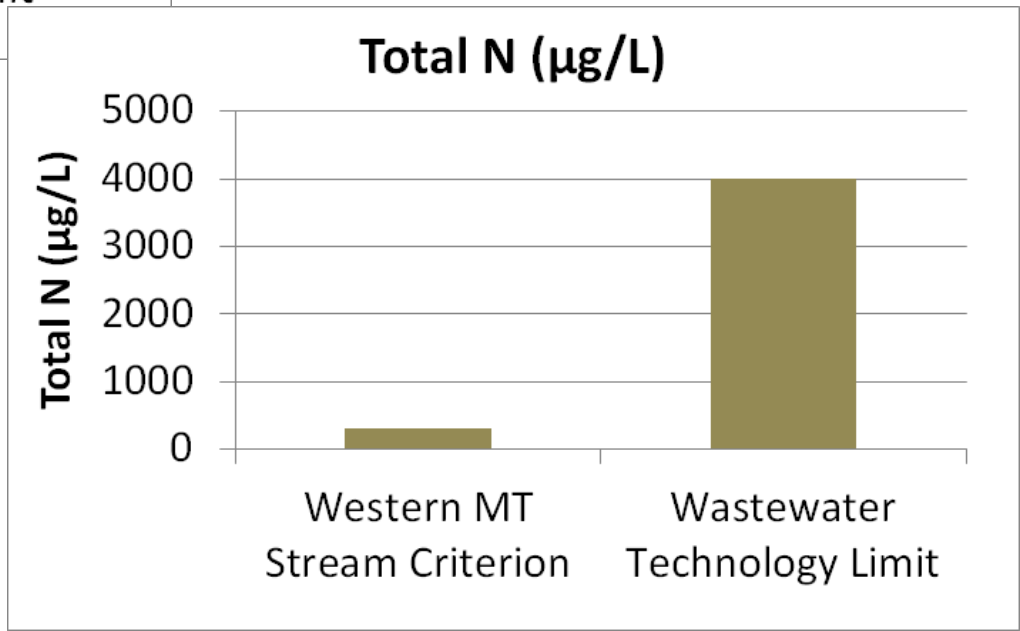
Criteria Derived Using Modeling

Large River Segment	Period When Criteria Apply	Total Phosphorus (µg/L)	Total Nitrogen (µg/L)
Yellowstone River (Bighorn River confluence to Powder River confluence)	August 1 - October 31	55	655
Yellowstone River (Powder River confluence to stateline)	August 1 - October 31	95	815

Adapted from M. Suplee

Montana Implementation

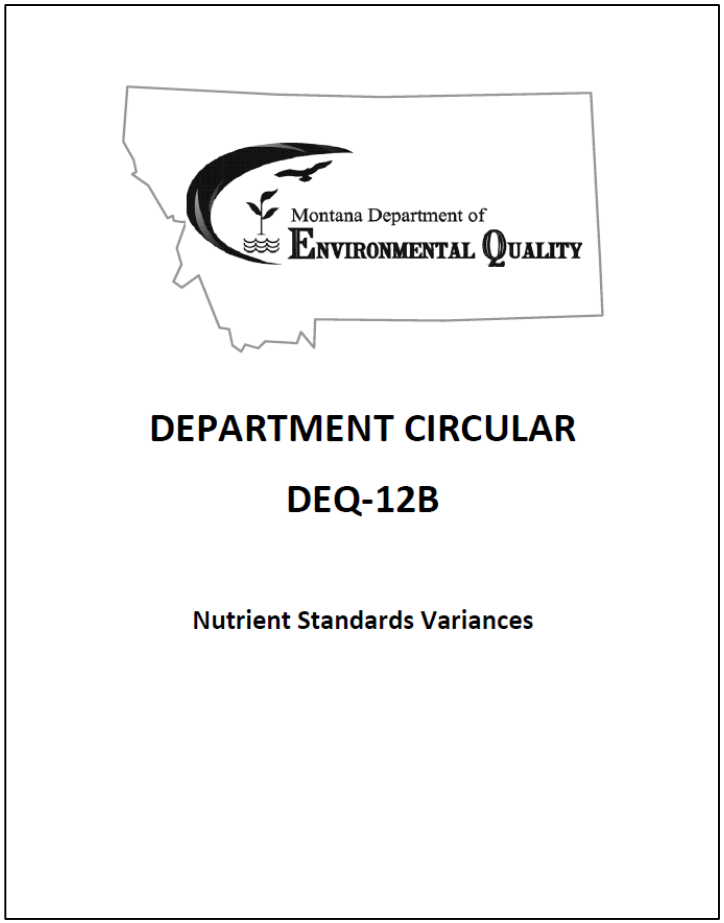




Adapted from M. Suplee

Montana Variances

- Recognizing the limits of technology and economic limitations for permittees, Montana's Legislature adopted laws to allow for variances to the water quality standards
- In 2009, Montana passed Senate Bill 95
- In 2011, Montana passed Senate Bill 367
- Bills codified at 75-5-313



Variances

- Variances are temporary modifications to a designated use and water quality criteria associated with the use
- Recognizes that in some circumstances it is not feasible for point source dischargers to meet water quality criteria
- Permit is written to a modified water quality standard in circumstances where it has been shown that the underlying standard is infeasible at the present time, but may be feasible in the future
- Generally, variances are based on demonstration that standards would cause “widespread economic and social impact”

Montana General Variances

- End-of-pipe treatment requirements for general nutrient standards variance (general variance)

	Monthly Average	
Discharger Category	Total Phosphorus (mg/L)	Total Nitrogen (mg/L)
≥ 1.0 Million gallons Per Day	1.0	10.0
< 1.0 Million Gallons Per Day	2.0	15.0
Lagoons Not Designed to Actively Remove Nutrients	Maintain current performance	Maintain current performance

- Discharger may apply for a general variance to total phosphorus, total nitrogen, or both
- May be established for a period not to exceed 20 years; reviewed every 3 years
- Compliance schedule may be granted to meet the treatment limits

Montana Individual Variances

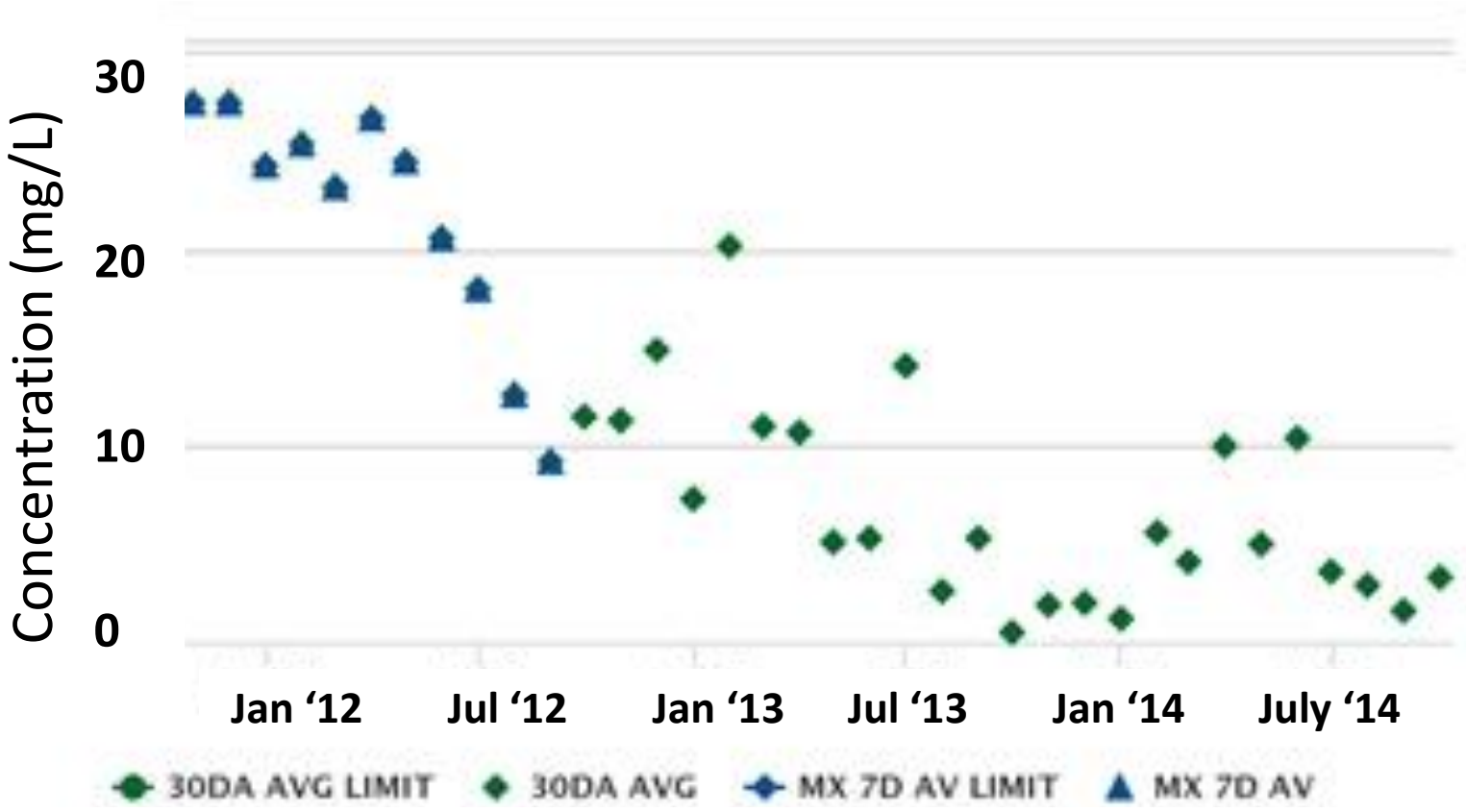
- Intended for permittees that would have financial difficulties meeting the general variance concentrations and are seeking individual nitrogen and phosphorus limits tailored to their specific economic situation
- Permittees can also demonstrate through water quality modeling and reach-specific data, that greater emphasis on reducing one nutrient will achieve similar in-stream results
- May be established for up to 20 years; reviewed by the Department every three years

Montana General Variances

- Permittees receiving general variances are required to conduct a facility optimization study that includes:
  - Evaluation of current facility operations and maintenance to optimize nutrient reduction with existing infrastructure;
  - Analysis of cost-effective methods of reducing nutrient loading such as nutrient trading
  - Evaluation of reuse, recharge, and land application options

Montana WWTP Optimization

Chinook Montana: WWTP Total Nitrogen Concentration Over Time



Oxidation Ditch Activated Sludge Mechanical Plant

Adapted from M. Suplee

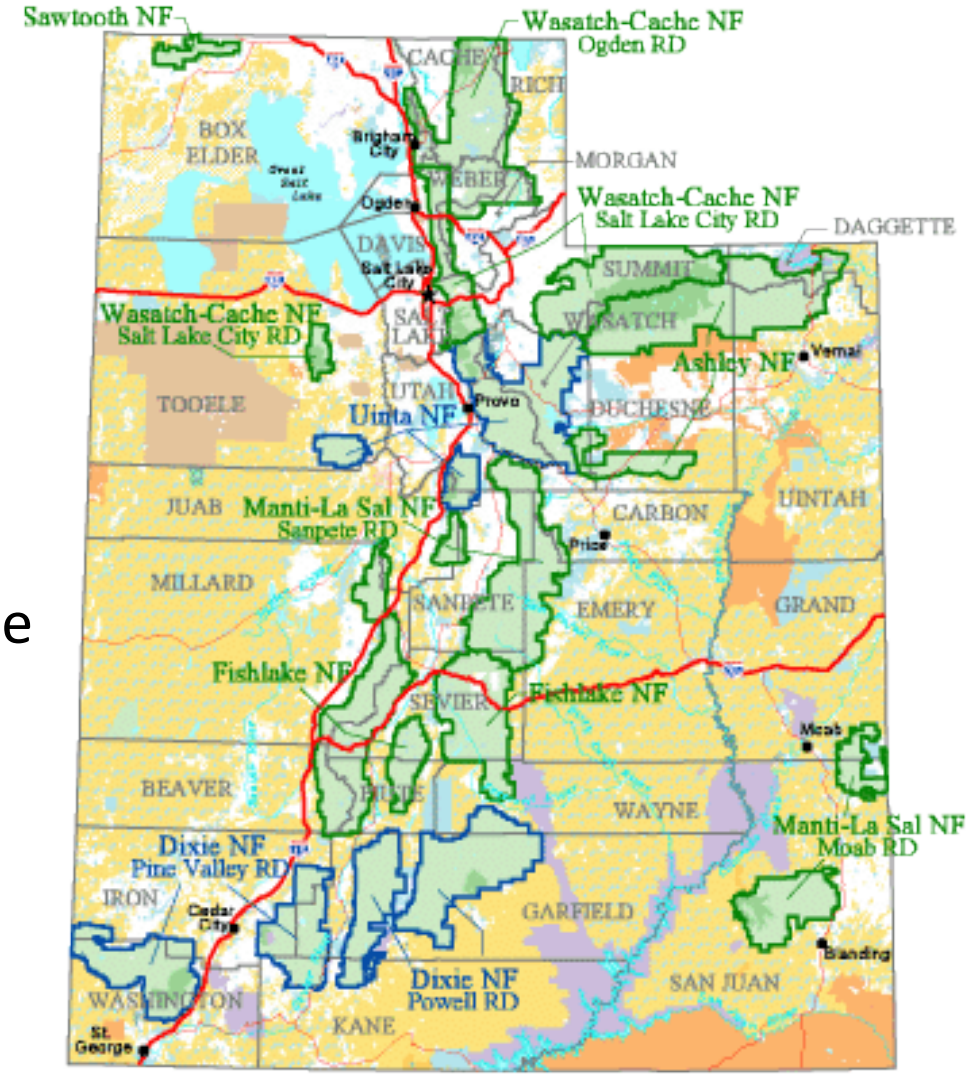
Montana Lagoon Optimization

- Compiling innovative, low-cost approaches to reduce ammonia and total nutrients from facultative lagoon discharges
- Plan on carrying out trial tests of methods with a group of cooperating communities, starting 2016

Adapted from M. Suplee

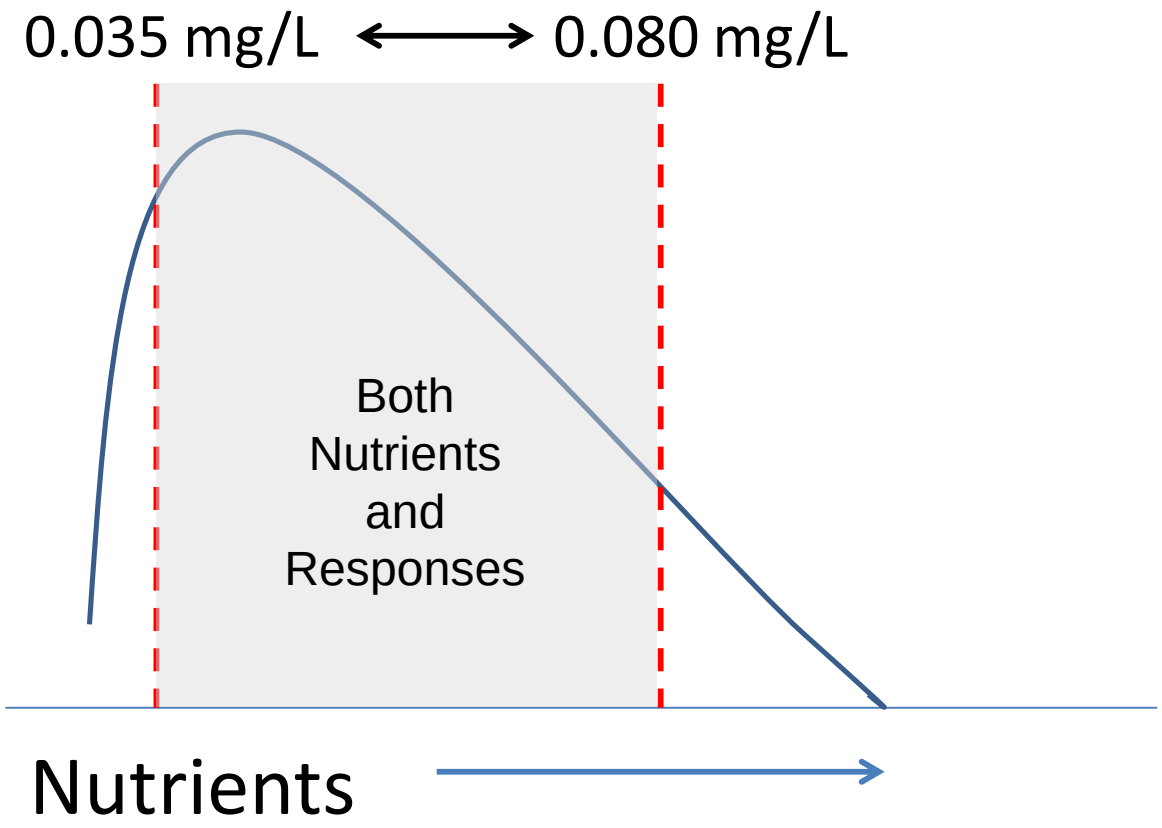
Utah Numeric Criteria

- Utah has been working on numeric nutrient criteria for headwater streams
- Most recent proposal is for combined criteria
- Combined criteria can be used when a state wants to rely on response parameters to indicate that a designated use is protected, even though N and/or P are above an adopted threshold



Utah Nutrient Criteria Headwaters

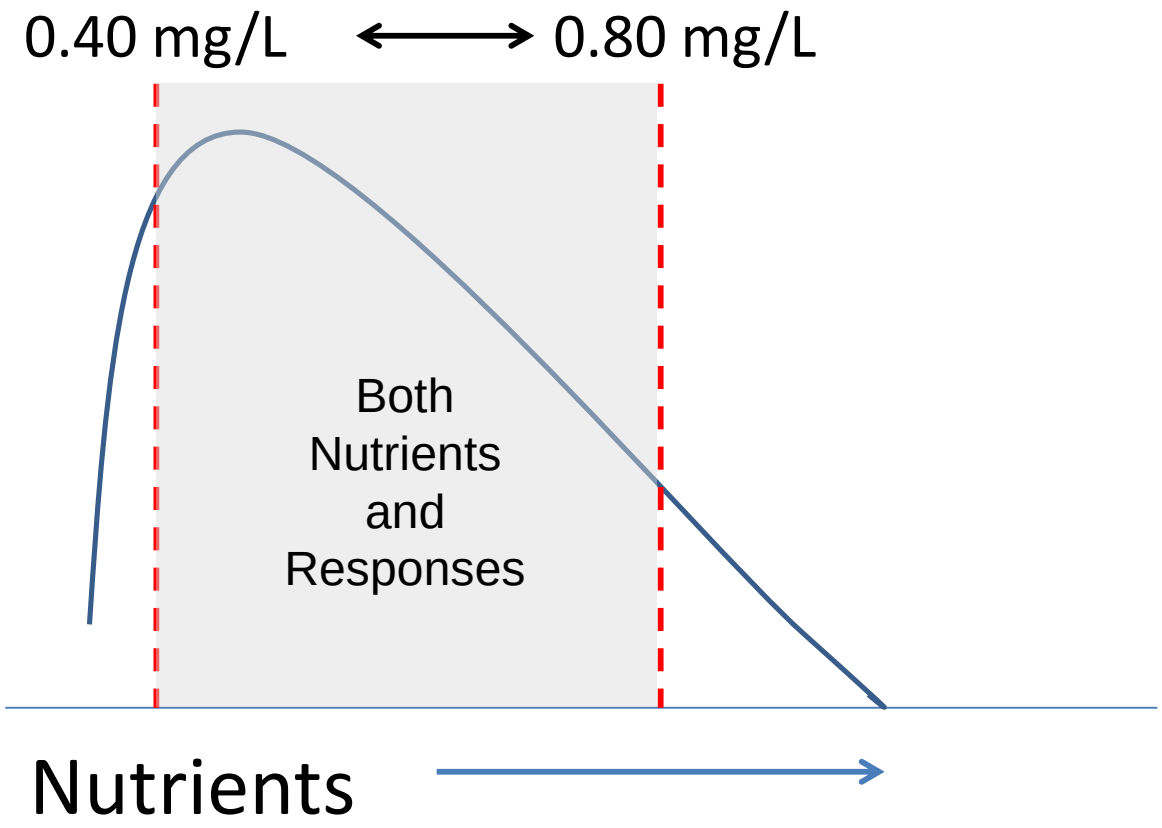
Total Phosphorus



Adapted from J. Ostermiller

Utah Nutrient Criteria Headwaters

Total Nitrogen



Adapted from J. Ostermiller

Utah Technology Based Limits

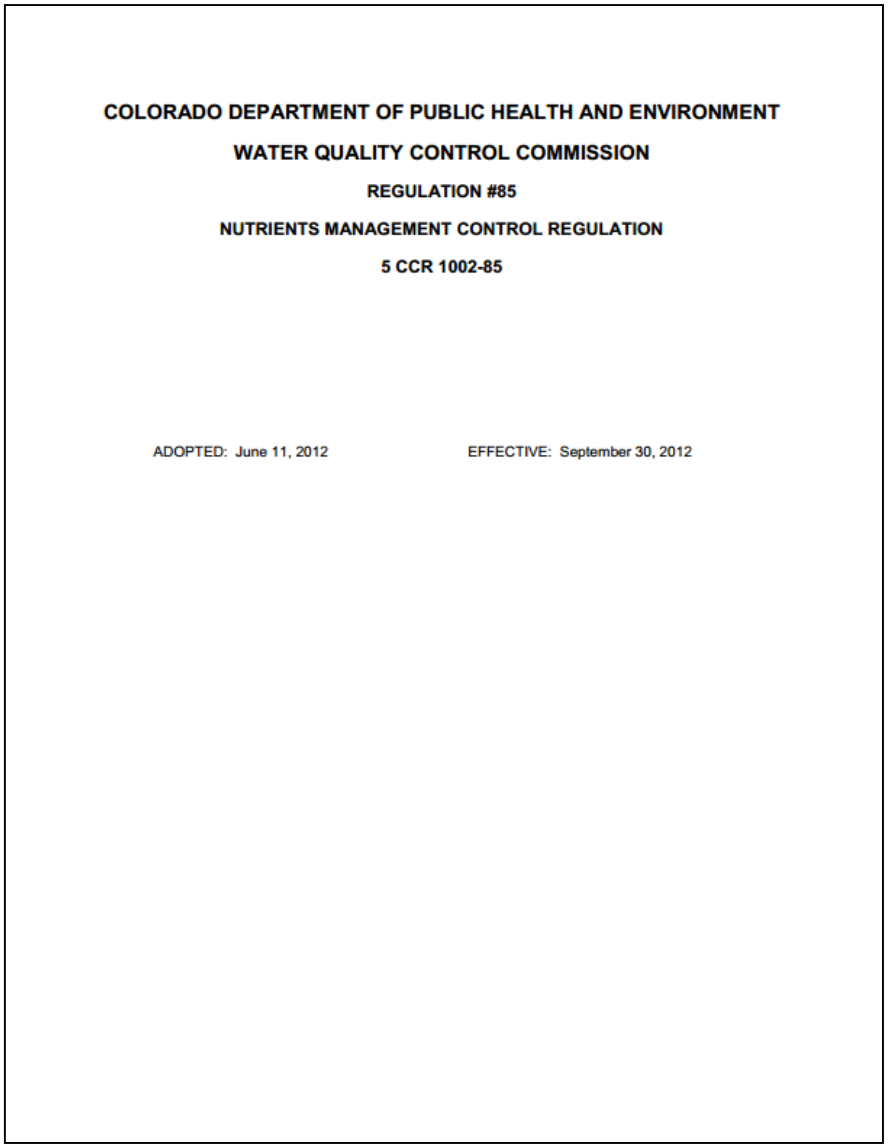
- In January 2015, Utah adopted technology based phosphorus effluent limits (TBPEL)
  - Non-lagoon treatment works: effluent must be less than or equal to an annual mean of 1.0 mg/L for total phosphorus

    TBPEL should be achieved by January 1, 2020
  - Lagoons: each facility evaluated to determine current annual average total phosphorus load based on average flows and concentrations

    Total phosphorus cap of 125% of the current annual average
  - Variances for TBPEL and Phosphorus Loading Caps

Colorado Numeric Limitations

- Regulation 85 established numeric limitations for dischargers (effective September 12, 2012)
- Established monitoring requirements for dischargers (began March 1, 2013)
  - Total phosphorus
  - Total nitrogen
  - Total inorganic nitrogen
- Sampling monthly at majors and every two months at minors



COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

WATER QUALITY CONTROL COMMISSION

REGULATION #85

NUTRIENTS MANAGEMENT CONTROL REGULATION

5 CCR 1002-85

ADOPTED: June 11, 2012 EFFECTIVE: September 30, 2012

Questions?

Lindsay Patterson

Wyoming Surface Water Quality Standards

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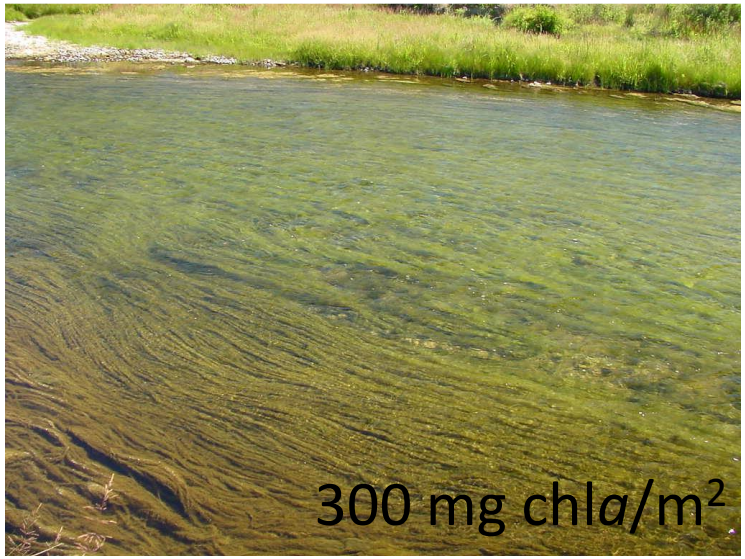
307-777-7079

Montana Nutrient Criteria

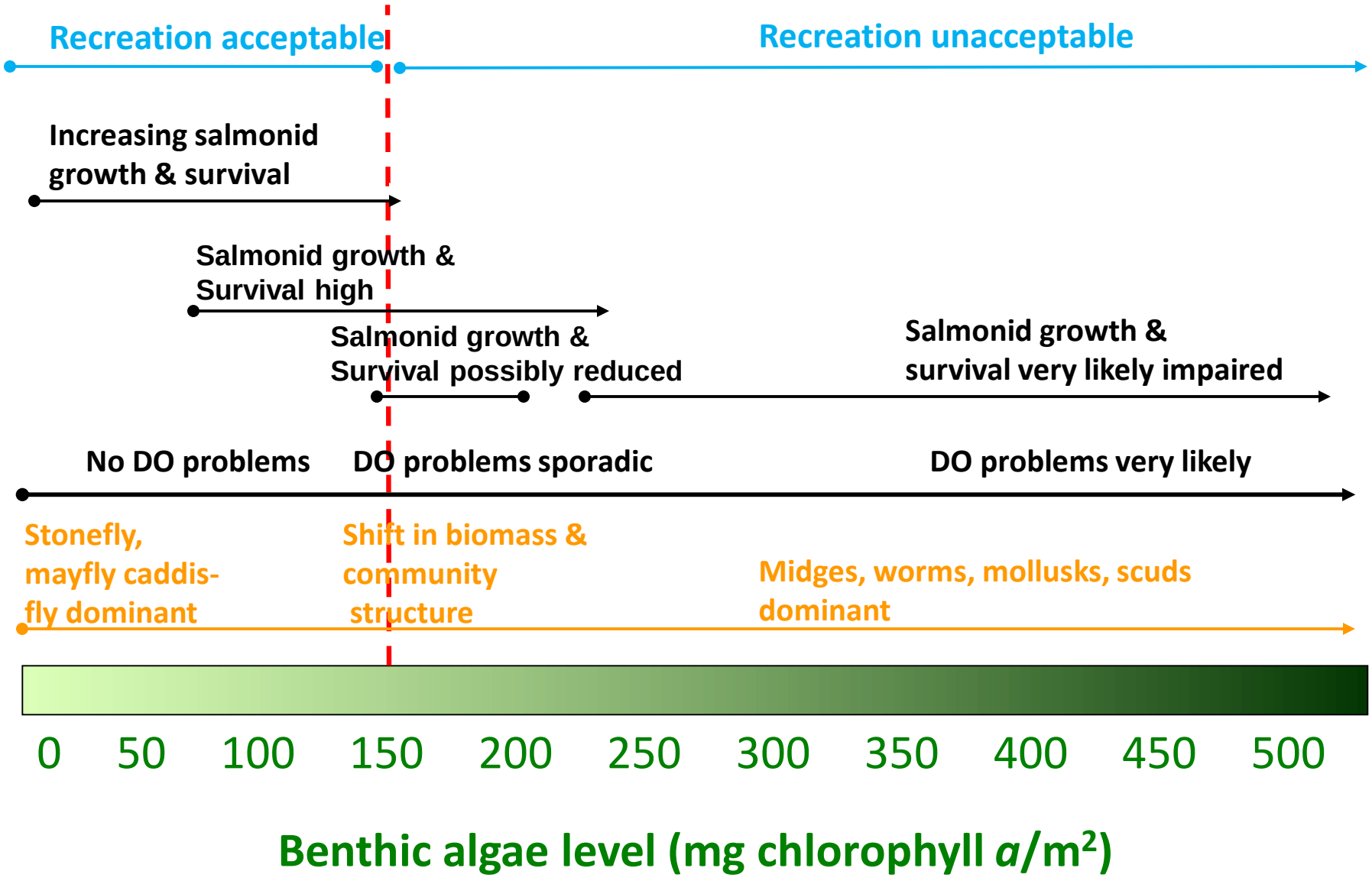


Attached algae growth commonly quantified as chlorophyll a per square meter of stream bottom

≤ 150 mg Chla/m^2 preferred by MT public for recreation
-Suplee et al. (2009)

Adapted from M. Suplee

Montana Nutrient Criteria



Adapted from M. Suplee

Montana Nutrient Criteria

Eastern Montana Wadeable Streams

Low gradient, warm, often turbid, macrophytes, warm-water fishes

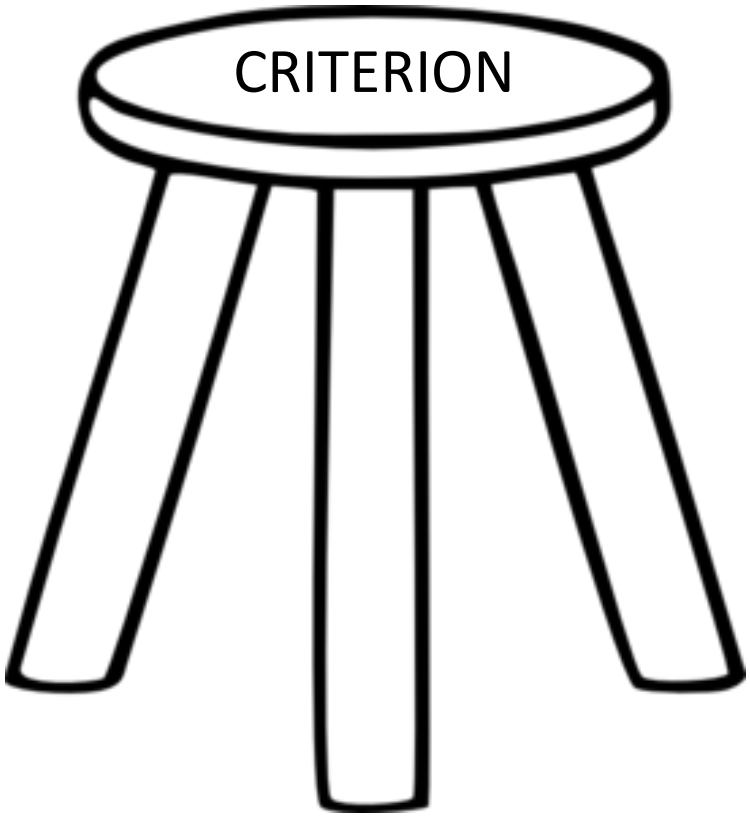
Fish and dissolved oxygen concentrations key drivers

Adapted from M. Suplee

Montana Nutrient Criteria

Wadeable Stream Nutrient Criteria Derivation Process

N:P Resource Ratio
(Redfield Ratio)



Comparison to
Regional
Reference-site
Data

Regional Dose-response studies

Adapted from M. Suplee

Montana Nutrient Criteria

Montana Department of Environmental Quality

Scientific and Technical Basis of the Numeric Nutrient Criteria for Montana's Wadeable Streams and Rivers: Update 1

May 2013

Prepared by:
Water Quality Planning Bureau, Standards Section
Montana Department of Environmental Quality
Water Quality Planning Bureau
1520 E. Sixth Avenue
P.O. Box 200901
Helena, MT 59620-0901

WQPBWQSTR-002

Criteria Document

Colorado Numeric Limitations

	Annual Median	
Discharger Category	Total Phosphorus (mg/L)	Total Inorganic Nitrogen (mg/L)
> 1.0 Million Gallons Per Day Discharging Prior to May 31, 2012	1.0	15.0
New Domestic Wastewater Facilities	0.7	7.0

- Regulation exempts:
  - Facilities with design capacity ≤ 1.0 million gallons per day
  - Facilities owned by disadvantaged communities (those with population ≤ 5,000 or median household income 80% or less of statewide median household income
- Regulation delays implementation of effluent limits until May 31, 2022 for:
  - Facilities with design capacity ≤ 2.0 million gallons per day
  - Facilities in low priority 8 digit hydrologic unit codes